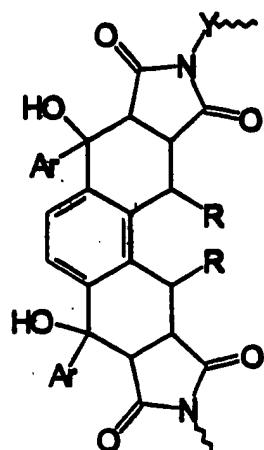


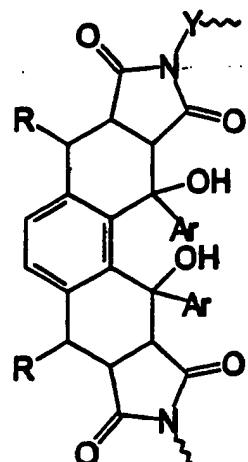
THE INVENTION CLAIMED

1. Polyimide having a glass transition temperature (Tg) ranging up to about 300° C, high thermal-oxidative stability and decomposition-stability temperatures as high as 350°C derived from the photochemical cyclopolymerization of approximately stoichiometric amounts of an aromatic ketone and at least one dienophile; said polyimide having a repeating unit of a formula selected from the group consisting of:

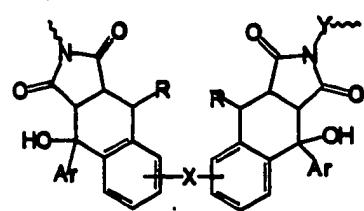
(a)



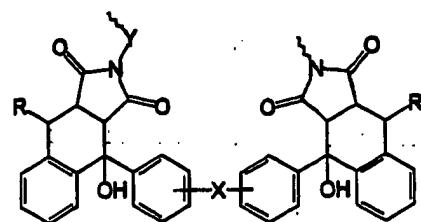
(b)



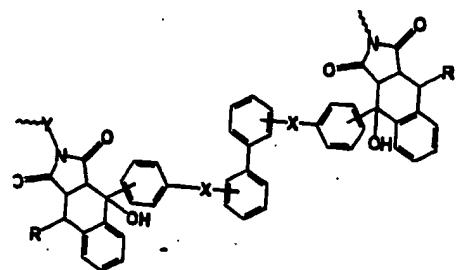
(c)



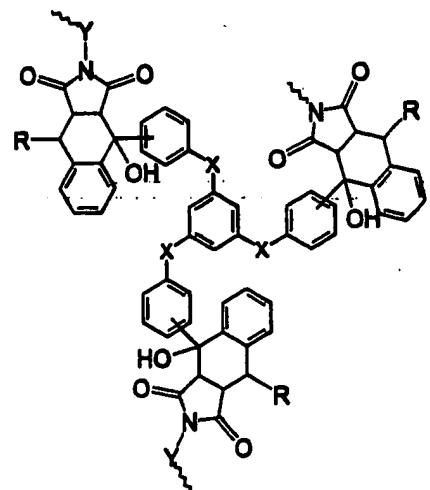
(d)



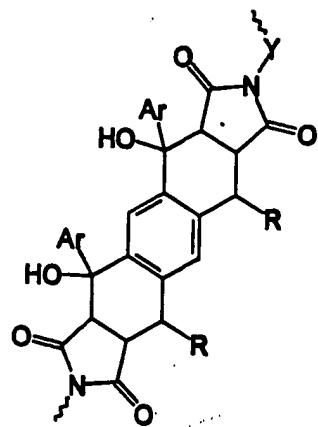
(e)



(f)

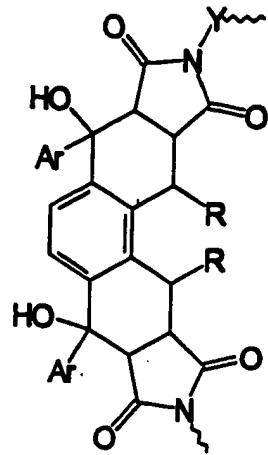


(g)



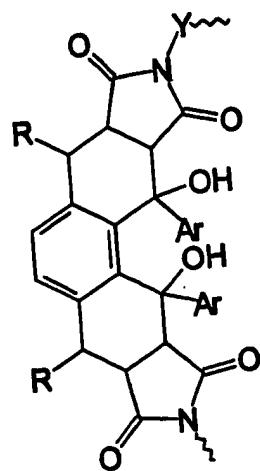
wherein Ar in the repeating unit is the same or a different aromatic or substituted aromatic radical, R is selected from the group consisting of hydrogen, heteroaryl radicals, and lower alkyl radicals of 1 to 8 carbons, X is selected from the group consisting of nil, oxygen, sulfur, -C=O, -CH₂, alkyl radicals of 1 to 8 carbons, ether radicals, ester radicals, and aryl radicals, and Y is selected from the group consisting of nil, oxygen, -CH₂, -C=O, SO₂, ether radicals, ester radicals, polyether radicals, polyester radicals, aromatic radicals, and alkyl radicals.

2. The polyimide of Claim 1 wherein the repeating unit has the formula:



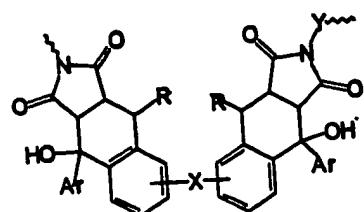
3. The polyimide of Claim 1 wherein the repeating unit has the formula:

(b)



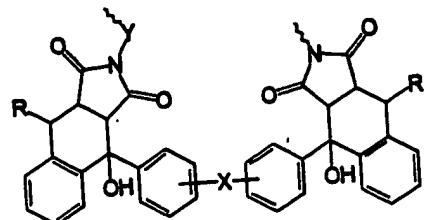
4. The polyimide of Claim 1 wherein the repeating unit has the formula:

(c)



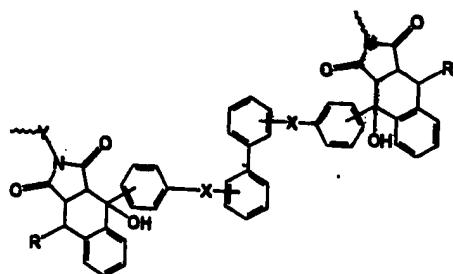
5. The polyimide of Claim 1 wherein the repeating unit has the formula:

(d)



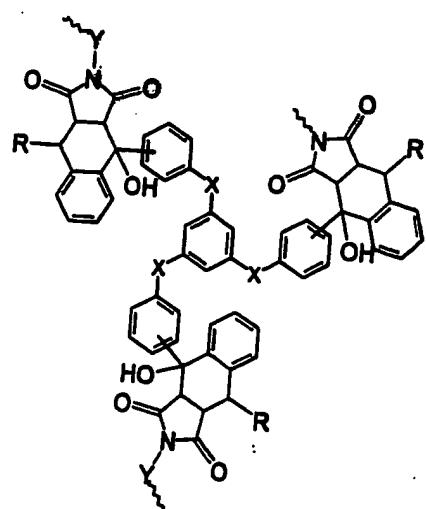
6. The polyimide of Claim 1 wherein the repeating unit has the formula:

(e)



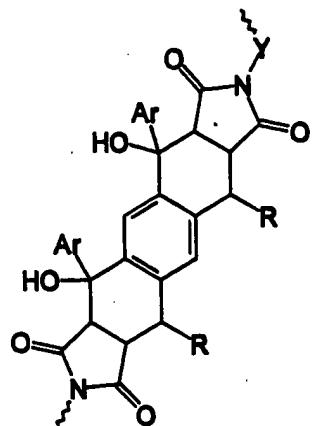
7. The polyimide of Claim 1 wherein the repeating unit has the formula:

(f)

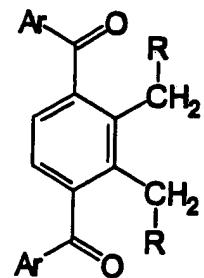


8. The polyimide of Claim 1 wherein the repeating unit has the formula:

(g)

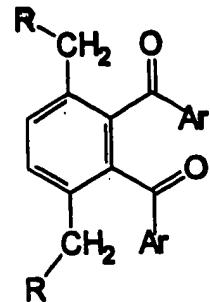


9. The polyimide of Claim 2 wherein the ketone has the formula:



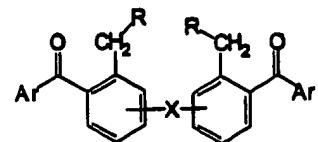
wherein R is hydrogen and Ar is an aromatic radical.

10. The polyimide of Claim 3 wherein the ketone has the formula:



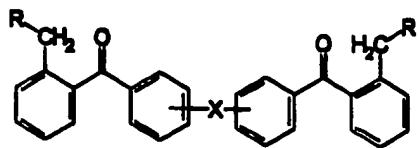
wherein Ar is a substituted aromatic radical and R is a lower alkyl radical of 1-8 carbons.

11. The polyimide of Claim 4 wherein the ketone has the formula:



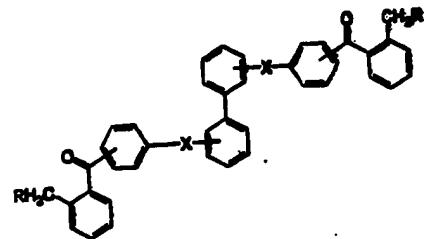
wherein Ar is an aromatic radical, R is hydrogen and X is $-\text{CH}_2-$.

12. The polyimide of Claim 5 wherein the ketone has the formula:



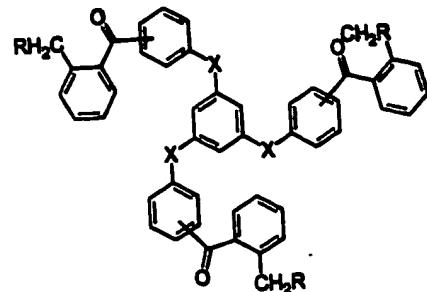
wherein R is hydrogen and X oxygen.

13. The polyimide of Claim 6 wherein the ketone has the formula:



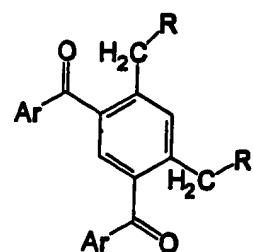
wherein R is hydrogen and X is -CH₂.

14. The polyimide of Claim 7 wherein the ketone has the formula:



wherein R is an alkyl radical of 1 to 8 carbons and X is -CH₂.

15. The polyimide of Claim 8 wherein the keytone has the formula:



wherein R is hydrogen and Ar is an aromatic radical.

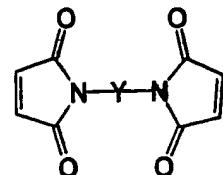
16. The polyimide of Claim 1 wherein the dienophile is selected from the group consisting of bismaleimides, trismaleimides, and mixtures of bismaleimides, and/or trismaleimides and maleimides wherein the maleimides range from 0 to about 25 molar percent of the mixture.

17. The polyimide of Claim 16 wherein the dienophile is at least one bismaleimide.

18. The polyimide of Claim 16 wherein the dienophile is at least one trismaleimide.

19. The polyimide of Claim 16 wherein the dienophile is mixtures of bismaleimides, and/or trismaleimides and maleimides.

20. The polyimide of Claim 16 wherein the bismaleimide has the formula:



wherein Y is $-\text{CH}_2-$.